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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,574	01/23/2004	Teiichiro Umezawa	Q79566	3033
23373	7590	09/13/2005	EXAMINER	
SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			BERNATZ, KEVIN M	
			ART UNIT	PAPER NUMBER
			1773	

DATE MAILED: 09/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

7.12

<b>Office Action Summary</b>	<b>Application No.</b> 10/762,574	<b>Applicant(s)</b> UMEZAWA ET AL.	
	<b>Examiner</b> Kevin M. Bernatz	<b>Art Unit</b> 1773	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 20 May 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 3, 4 and 8-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 5-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-10 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/23/04</u> . | 6) <input type="checkbox"/> Other: _____  |

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## **DETAILED ACTION**

### ***Examiner's Comments***

1. Regarding the limitation(s) "epitaxial relationship" in claim 6, the Examiner has given the term(s) the broadest reasonable interpretation(s) consistent with the written description in applicants' specification as it would be interpreted by one of ordinary skill in the art. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Donaldson Co., Inc.*, 16 F.3d 1190, 1192-95, 29 USPQ2d 1845, 1848-50 (Fed. Cir. 1994). See MPEP 2111. Specifically, the Examiner notes that the broadest reasonable interpretation of an "epitaxial relationship" is simply that the layers are "deposited" onto each other. The Examiner further notes that since applicants' claims are open to additional elements (i.e. "comprising") and the present claim language does not recite "directly deposited" or a "direct epitaxial relationship", that the first and second magnetic layers do not need to be directly adjacent to the spacer layer to meet the claimed "epitaxial relationship" limitation.

### ***Election/Restrictions***

2. In the election filed May 20, 2005, since applicants did not distinctly point out any alleged errors in the restriction requirement mailed March 21, 2005, the election is being treated as an election without traverse.
3. Applicant's election without traverse of Group I, claims 1 – 8, and species II in the paper filed May 20, 2005 is acknowledged. Claims 3, 4 and 8 - 10 are withdrawn from

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further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention and/or species, there being no allowable generic or linking claim. The requirement is still deemed proper and is therefore made FINAL. The Examiner notes that applicants had inadvertently included claim 8 as reading on specie II, but the Examiner notes that claim 8 requires controlling the surface roughness of the *substrate*, not the *spacer layer*, hence falling within the scope of nonelected specie I.

### ***Specification***

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: insert "With Controlled Surface Roughness" after "disk".

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1 and 5 - 7 rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a surface roughness of the spacer layer being not greater than a thickness of said spacer *and also not greater than 1.2 nm*, does not reasonably provide enablement for producing an exchange coupling structure possessing a "first" and "second" magnetic layer separated by a spacer layer of any

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thickness, wherein the surface roughness is less than the thickness of the spacer layer. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims. The Examiner notes that the only working exchange coupling structures disclosed by applicants are those which possess a spacer layer having a thickness of 1.2 nm or less. The broad recitation in claim 1 without the upper limit on the thickness of the spacer layer could cover such un-enabled embodiments as a NMR apparatus (usually a toroid or disk shape) having two magnetic layers separated by "spacer layer(s)" having a thickness on the order of meters. Clearly the surface roughness of the "spacer layer(s)" would be less than 1 m, which would be an embodiment covered by the claim language but clearly not enabled as a working magnetic disk as described in the as-filed specification. As such, for the purpose of evaluating the prior art, the Examiner has interpreted claim 1 to be limited to those embodiments having a thickness of the spacer layer of 1.2 nm or less (and hence, a Ra of 1.2 nm or less).

### ***Double Patenting***

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double

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patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1, 2 and 5 – 7 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 - 12 of U.S. Patent No. 6,759,138 B2 (Tomiyasu et al.). Although the conflicting claims are not identical, they are not patentably distinct from each other because Tomiyasu et al. claims a magnetic recording medium comprising a substrate (*claims 1 and 5*) and an exchange coupling film on said substrate surface meeting applicants' claimed structural limitations (*claim 1: first and second magnetic layers and spacer layer formed therebetween*), wherein said spacer layer has a surface roughness meeting applicants' claimed limitations (*claim 3 –  $Ra < 0.6\text{ nm}$* ).

Tomiyasu et al. does not explicitly disclose a "disk" substrate, but recording media are well known to be formed in disk shape for use in hard drives. Tomiyasu et al. also fails to explicitly claim the surface roughness of the "principal" surface of the spacer layer, but the Examiner deems that such a limitation is within the knowledge of one of ordinary skill in the art since a surface roughness refers to the roughness of the *exposed* surface after deposition, and layers are generally deposited in sequence upon the substrate.

Regarding claims 5 – 7, Tomiyasu et al. claim Ru spacer layers producing antiferromagnetic coupling (*claims 1 and 4*). See Paragraph 1 above for the scope given the term "epitaxial relationship" in claim 6. The Examiner notes that the materials

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disclosed/claimed by Tomiyasu et al. are identical to the materials disclosed by applicants which is why the Examiner deems that the claimed subject matter reads on the language of claim 5.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1, 2 and 5 – 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Tomiyasu et al. ('138 B2); - **and** -

Claims 1, 2 and 5 – 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Tomiyasu et al. (U.S. Patent App. No. 2003/0104248 A1); - **and** -

Claims 1, 2 and 5 – 7 are rejected under 35 U.S.C. 102(f) since applicants did not appear to invent the claimed subject matter since Tomiyasu et al. ('138 B2) has a different inventive entity than the pending application. See MPEP 2137.

See '248 A1 for paragraph citations in the following rejection.

Regarding claims 1 and 2, Tomiyasu et al. disclose a magnetic disk comprising a disk substrate and an exchange coupling film meeting applicants' claimed structural

limitations (*Paragraphs 0009 – 0013 and 0038*), wherein the spacer layer has a surface roughness meeting applicants' claimed limitations (*Paragraphs 0036 – 0038*).

Regarding claims 5 - 7, Tomiyasu et al. disclose a recording disk meeting applicants' claimed limitations (*Figures; claim 1; and Paragraphs 0029 – 0038*).

11. Claims 1, 2, 5 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Kikitsu et al. (U.S. Patent App. No. 2005/0041335 A1).

Regarding claims 1 and 2, Kikitsu et al. disclose a magnetic disk comprising a disk substrate (*Paragraph 0288 – 0297*) and an exchange coupling film on said substrate surface comprising a first magnetic layer ("*functional layer*"), a second magnetic layer farther from said substrate ("*recording layer*") than said first magnetic layer, and a spacer layer ("*spacer*") interposed between said first and second magnetic layers and having a principal surface nearer to said second magnetic layer than said first magnetic layer, said principal surface of the spacer layer having a surface roughness meeting applicants' claimed limitations (*Paragraphs 0291 and 0295: where the Examiner notes that a value of  $R_a = 0.5$  nm reads on claims 1 and 2 when the spacer layer also has a thickness of 0.5 nm as in the Example in Paragraph 0289*).

Regarding the limitations of claim 5, it has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily or inherently



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possess characteristics of claimed products where the rejection is based on inherency under 35 USC 102 or on *prima facie* obviousness under 35 USC 103, jointly or alternatively. Therefore, the *prime facie* case can be rebutted by **evidence** showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

In the instant case, Kikitsu et al. disclose substantially identical materials as applicants for both the spacer and magnetic layers (*Paragraphs 0289 and 0297*).

Therefore, in addition to the above disclosed limitations, the presently claimed property limitations in claim 5 would have inherently been present in at least the example in Paragraph 0289 because Kikitsu et al. disclose substantially identical materials as used by applicants for the spacer and first and second magnetic layers.

Regarding claim 6, Kikitsu et al. disclose depositing the first, second and spacer layers onto each other, hence meeting the claimed limitations per the scope afforded the term "epitaxial relationship" in Paragraph 1 above.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 1, 2 and 5 – 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikitsu et al. ('335 A1) in view of Fukuzawa et al. (U.S. Patent App. No. 2005/0030676 A1).

Regarding claims 1 and 2, Kikitsu et al. disclose a magnetic disk comprising a disk substrate (*Paragraph 0288 – 0297*) and an exchange coupling film on said substrate surface comprising a first magnetic layer ("*5 nm thick Co*"), a second magnetic layer farther from said substrate ("*5 nm thick Co*") than said first magnetic layer, and a spacer layer ("*0.8 nm thick Ru*") interposed between said first and second magnetic layers and having a principal surface nearer to said second magnetic layer than said first magnetic layer. Kikitsu et al. further teach that the thickness of the Ru layer is any value less than 1 nm (*Paragraph 0077*).

Kikitsu et al. fails to disclose the surface roughness of the Ru spacer layer.

However, Fukuzawa et al. teach that in synthetic antiferromagnetic structures (which is the Co/Ru/Co structure), Fukuzawa et al. teach controlling the surface roughness of the spacer layer to be less than the thickness of the layer in order to maintain the thermal stability of the coupling function of the layer (*Paragraphs 0309 – 0314*). While the Examiner acknowledges that Fukuzawa et al. is directed to a

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magnetic *head* and Kikitsu et al. is directed to a magnetic *medium*, the Examiner notes that one of ordinary skill in either art would readily appreciate that synthetic antiferromagnetic structures are used in both related fields and it is deemed that it would have been obvious to turn to either field for teachings on improvements related to synthetic antiferromagnetic structures.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Kikitsu et al. to use a spacer layer meeting applicants' claimed surface roughness as taught by Fukuzawa et al. in order to maintain the thermal stability of the coupling function of the layer.

Regarding the limitations of claim 5, it has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily or inherently possess characteristics of claimed products where the rejection is based on inherency under 35 USC 102 or on *prima facie* obviousness under 35 USC 103, jointly or alternatively. Therefore, the *prima facie* case can be rebutted by **evidence** showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

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In the instant case, Kikitsu et al. disclose substantially identical materials as applicants for both the spacer and magnetic layers (*Paragraphs 0289 and 0297*).

Therefore, in addition to the above disclosed limitations, the presently claimed property limitations in claim 5 would have necessarily been present in at least the example in Paragraph 0289 because Kikitsu et al. disclose substantially identical materials as used by applicants for the spacer and first and second magnetic layers.

Finally, even though not every embodiment of Kikitsu et al. may possess the claimed "melting point" limitations, the Examiner notes that this is simply another way to claim known materials. As such, Kikitsu et al. clearly disclose embodiments meeting the claimed limitations as functional equivalents to embodiments which may or may not meet the claimed limitations. Applicants are invited to present evidence of unexpected results when the melting point behavior is controlled to the claimed limitations, but are reminded that the claims must be commensurate in scope to the showing of unexpected results to be allowable.

Regarding claim 6, Kikitsu et al. disclose depositing the first, second and spacer layers onto each other, hence meeting the claimed limitations per the scope afforded the term "epitaxial relationship" in Paragraph 1 above.

Regarding claim 7, Kikitsu et al. disclose the first and second magnetic layer being antiferromagnetically coupled due to the spacer layer (*Paragraphs 0077 and 0290*).

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**Conclusion**

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB  
August 1, 2005

  
Kevin M. Bernatz, PhD  
Primary Examiner